# Geological disposal of radioactive waste

# Pre-application advice and scrutiny of Radioactive Waste Management Limited

## Annual Report

## Apr 2015 to Mar 2016

Issue 1

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We would welcome your feedback on this document.

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For information on how we regulate geological disposal, and for copies of this and other reports in the series, visit the joint regulators' web pages at:

https://www.gov.uk/government/collections/scrutiny-of-radioactive-waste-management-directorates-rwmd-work

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# Foreword

This is a joint publication by the Environment Agency and the Office for Nuclear Regulation to inform others about our oversight of Radioactive Waste Management Limited's (RWM) work related to geological disposal of radioactive waste. Prior to the start of formal regulation, we have established agreements with RWM to provide regulatory advice in relation to geological disposal. The regulators are working together to make sure that any future geological disposal facility (GDF) will meet our required high standards for environmental protection, safety, security, radioactive materials transport and safeguards.

We are engaging with RWM for two reasons. Firstly, to ensure that any future applications we receive in relation to a GDF take full account of our permitting and licensing requirements. Secondly, to ensure that the advice RWM currently provides to waste producers, about how they should package their radioactive waste for future geological disposal, is appropriate.

We maintain an open, transparent and constructive dialogue with RWM; this is beneficial in building RWM's understanding of our regulatory expectations. It is also helpful in building our understanding of RWM's work in relation to geological disposal and how we will deliver our regulatory roles with respect to a GDF in the future.

We have no regulatory role in the decision-making process for selecting potential sites for a GDF. However, separate to our oversight of RWM reported here, we also provide advice and comment on matters within our regulatory remits to inform that decision-making process.

As independent regulators, we are committed to making our work open and transparent. We trust that this report will be useful to others in introducing our standards and requirements for a GDF and in providing insight into how we will ensure that these will be met in any future applications.

# Executive Summary

Government policy for managing higher activity radioactive waste (HAW) in the long term is through geological disposal, which will be implemented alongside ongoing interim storage and supporting research. Radioactive Waste Management Limited (RWM) is responsible for implementing government policy on geological disposal of HAW and for providing radioactive waste management solutions. It is currently undertaking preparatory work to plan for geological disposal - work described as “generic”, as no sites have been identified yet.

Our dialogue with RWM has helped it develop a good understanding of the regulatory framework and associated regulatory submissions required to support environmental permitting and nuclear site licensing.

This report summarises the work carried out by the Environment Agency and the Office for Nuclear Regulation to scrutinise the work of RWM during 2015 to 2016. The main outcomes from our work in this reporting period are as follows:

- Our engagement with RWM and our associated inspections show that RWM is making progress towards becoming an organisation capable of holding an environmental permit and a nuclear site licence for a GDF. RWM is developing the Health, Safety, Security, Environment & Quality (HSSEQ) and independent oversight understanding and arrangements that we would expect, and in response to our advice RWM has strengthened its HSSEQ function to provide improved in-house assurance capability and delivery.

- We have consistently emphasised the importance of waste package records for disposability. We are pleased that RWM has engaged with waste producers and, as a result, the industry now recognises the importance of adequate and appropriate information management to support geological disposal, and that addressing this is now regarded as a matter of high priority. We consider RWM’s work in this area represents a significant step towards ensuring that appropriate information and records are identified, collected, maintained and available to support the long-term management of HAW.

- RWM has made significant progress towards addressing the recommendations from our review of its 2010 generic Disposal System Safety Case (gDSSC) and this should help improve the quality of any future site-specific safety case submissions. Our interactions with RWM on its developing gDSSC have also informed our preparations for reviewing the 2016 gDSSC, and should provide for a more efficient and effective review process.

- We are encouraging RWM to keep a range of options for the implementation of geological disposal open, even if some of the options are not currently favoured or might be implemented only under special circumstances. As a result, we understand that RWM’s 2016 gDSSC will be more balanced in its coverage of different geological environments and concepts. Our advice has helped RWM to improve its generic disposal system functional and technical specifications. In particular, the 2016 gDSSC will have a new section on environmental safety functions, and will make clear the distinction between technical requirements and planning assumptions. Such additions will be an improvement, and we consider the specifications are developing appropriately to support implementation of geological disposal.

- Previously, we noted the significant omission of any consideration of non-radiological hazardous substances and non-hazardous pollutants in RWM’s 2010 gDSSC. Subsequently, we have helped RWM to understand our regulatory expectations and requirements. RWM’s 2016 gDSSC will

include a specific section relating to the behaviour of non-radiological species in groundwater, and results from RWM's work to date will be included in the 2016 environmental safety case.

- RWM has developed a new methodology for determining fissile material limits for waste packages, but is yet to implement it. RWM intends to incorporate the revised methodology into its Disposability Assessment Process and engage with waste producers to help inform and progress packaging plans. The new approach should result in less restrictive fissile limits for some waste packages and therefore help progress clean-up.

# Contents

# 1. Introduction

Radioactive waste has arisen and continues to arise from the UK's historic and ongoing nuclear power, research and defence programmes. To date there is no disposal route for the waste generated that is termed Higher Activity Radioactive Waste (HAW). Instead, HAW is stored on nuclear sites awaiting a disposal solution. HAW continues to be produced from nuclear sites and in smaller amounts from other users of radioactive material such as industry, hospitals and universities. New nuclear power stations, proposed for England and Wales, would add to the amount of HAW produced.

UK government policy for the long-term management of HAW is set out in the 2014 white paper [1] which sets out the framework for managing HAW in the long term through geological disposal, focussing on how a geological disposal facility (GDF) would be implemented in England.

The Nuclear Decommissioning Authority (NDA) is responsible for implementing government policy on the long-term management of radioactive waste, and Radioactive Waste Management Limited (RWM) is responsible for implementing government policy on geological disposal of HAW.

The Environment Agency (EA) (for England) and the Office for Nuclear Regulation (ONR) are responsible for ensuring that any future GDF (in England)[i] meets the required high standards for protecting people and the environment when it is being developed, while it is operating, and after it has closed. We will be responsible for granting the necessary nuclear site licences and environmental permits throughout this period. Regulatory control is likely to be required for many decades and possibly for more than a century. We are working together to make sure that any future GDF meets the required high standards for safety, security, safeguards, environmental protection, and radioactive waste transport. We are engaging with RWM now to ensure that any future applications for the development of a GDF we receive will take full account of our permitting and licensing requirements and to ensure that the advice RWM currently provides to waste producers, about how they should be packaging their radioactive waste for future geological disposal, is appropriate. This early engagement will also allow us to prepare for any licence or permit application we receive from RWM, in order to respond in an informed and timely way.

## 1.1. The Environment Agency

The Environment Agency will regulate the development of any future GDF in England under the Environmental Permitting (England and Wales) Regulations 2010 (EPR10), using a process known as 'staged regulation' [2]. This process only applies to a GDF. Staged regulation provides regulatory control from very early in the development of a GDF and enables us to maintain regulatory control throughout each stage of development from the start of intrusive site investigation, through construction and operation, and eventually to closure. The developer would need to satisfy our stringent requirements and gain regulatory approval before each stage of development could begin. In particular, disposal of radioactive waste would not be allowed without the appropriate environmental permit.

[i] this report does not cover the role of Natural Resources Wales (NRW) or Scottish Environment Protection Agency (SEPA)

## 1.2. The Office for Nuclear Regulation

The Office for Nuclear Regulation (ONR) is the independent regulator of nuclear safety and security across the UK. ONR's mission is to provide efficient and effective regulation of the nuclear industry, holding it to account on behalf of the public. ONR brings together the regulatory functions for nuclear safety, nuclear security, radioactive materials transport and conventional health and safety at nuclear sites, and is also responsible for ensuring that safeguards obligations on civil nuclear sites in the UK are met. The management and storage of radioactive waste on nuclear licensed sites is regulated by ONR.

Given the high hazard inventory of a GDF, the requirements of relevant EC Directives and international standards and relevant good practice, ONR considers that a future GDF should be subject to the requirements of the Nuclear Installations Act 1965 (NIA65) during its design, construction and operation, and regulated for nuclear safety purposes by ONR.

ONR therefore asked the Government to bring forward legislation to allow ONR to effectively and efficiently license a GDF as a facility designed or adapted for disposal. The Department for Business, Energy and Industrial Strategy (BEIS) is progressing work to prescribe a facility designed or adapted for disposal in the Nuclear Installations Regulations 1971 to provide ONR with the vires to grant a licence to a GDF.

Licensing a GDF will not impact on the environment agencies' requirements or permitting process. ONR would license the installation designed or adapted for disposal (that is, the design, construction and operation) of HAW. The EA will continue to be responsible for permissioning waste disposal operations and when disposal activities have ended.

## 1.3. Managing our advice to RWM

At this early stage, before formal licensing or permitting begins, we are providing advice to RWM; we are not making regulatory decisions about a GDF. We provide our pre-application advice and oversight through an ongoing programme of work, the scope of which is agreed each year with RWM.

We need to continue to make our regulatory interactions with RWM visible and we do this by publishing information from our scrutiny work wherever possible and practical (in the most part by providing a summary of our work and main recommendations to RWM in the annual reports of the scrutiny programme, such as this).

We have established controls to ensure that our advice throughout this pre-application period (a process that could span some tens of years) is auditable, and that RWM's efforts to address regulatory matters is monitored. RWM is tracking recommendations that have arisen from our scrutiny work since the early 2000s, which it uses as part of its demonstration of progress.

If, through our regulatory interactions, we identify a potentially important regulatory matter, we discuss it with RWM. If the matter cannot be quickly or easily resolved through our routine dialogue with RWM, we log and monitor it through the Regulatory Issue Resolution Process (RIRP). The process complements our routine dialogue with RWM - it does not capture all matters that we identify or discuss as a result of our regulatory interactions. Nor does it contain every important regulatory matter that a developer of a GDF will need to eventually resolve.

We prioritise these regulatory matters as Regulatory Issues (RI) or Regulatory Observations (RO) (Figure 1). An RI is an important regulatory matter that must be resolved in the current context, for example, at a

certain point in the GDF implementation programme. An RI may or may not be urgent to resolve, depending on the current context and the complexity of the issue. An RO is a regulatory finding that is important but cannot be fully resolved in the current context. This might be because it requires information to resolve it that can only be obtained or achieved at a later stage (for example, in a site-specific context). However, this does not preclude starting work to resolve the matter, the aim being to address and resolve regulatory matters raised at the earliest possible stage in the implementation of geological disposal and make progress.

The list of existing RIs and ROs is shown in Annex A. We will assess any outstanding RIs or ROs when we are required to make regulatory decisions.

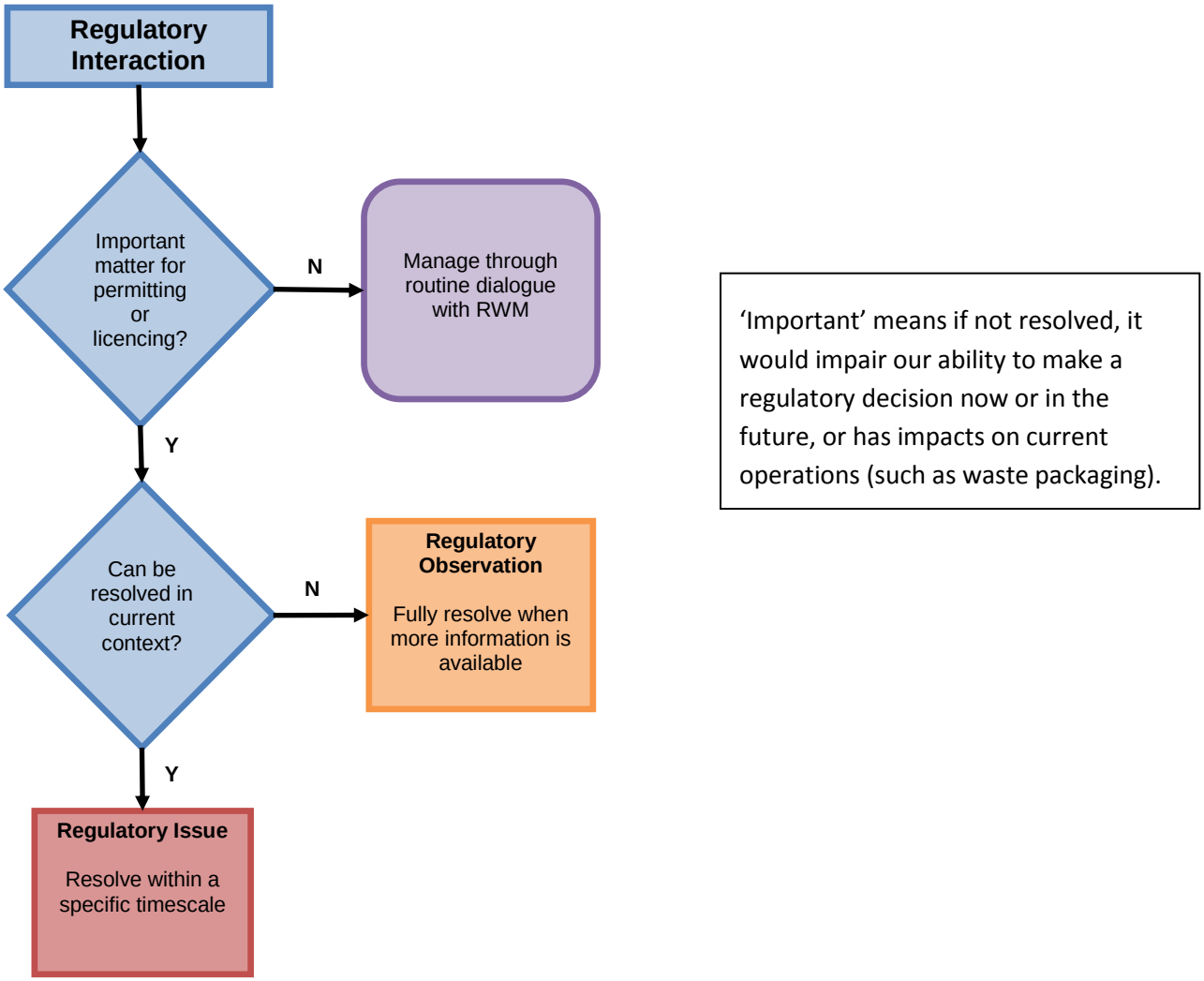


**Figure 1: Prioritisation within the Regulatory Issue Resolution Process (RIRP)**

We encouraged RWM to record and track all matters that may affect the implementation of geological disposal. We advised RWM in previous years on its management of issues and its issues register and have provided comments on its developing system. While RWM's issues register does include some of our regulatory issues and observations where they are within the scope of that register, our Regulatory Issue Resolution Process is only a sub-set of RWM's issues register. We consider that the publication of RWM's issues register represents good progress towards transparent and supportable decision-making, which should improve stakeholder confidence.

# 2. Planning for implementing geological disposal

Any future applications for a GDF must take full account of our permitting and licensing requirements. We are engaging with RWM to help to avoid unnecessary delays that might result if RWM were to provide inappropriate or incomplete information in support of any licence or permit application.

## 2.1. EA permitting requirements

We continued to provide regulatory advice to RWM on our expectations of its submissions required under the staged permitting process [2]. We consider RWM has a good understanding of the permissions framework and the associated regulatory submissions required to support environmental permitting. This should help RWM to meet our regulatory expectations for an application for an environmental permit if it decides to start intrusive investigation work, such as drilling deep boreholes, at any potential site for a GDF.

## 2.2. Groundwater (Daughter) Directive 2006

Radioactive waste containing substances with non-radiological hazardous or polluting properties must be disposed of in a manner that provides adequate protection to people and the environment. RWM will need to make progress towards developing waste acceptance criteria for hazardous or polluting substances in order to minimise the risk of reworking of waste that is being packaged now, or before a GDF becomes available. This will help ensure that packaging operations today produce disposable waste forms.

Previously we have advised RWM [3] to develop restrictions on hazardous or polluting substances, in order to meet statutory requirements for groundwater protection (Groundwater Daughter Directive 2006/118/EC (GWDD)) and to make timely progress in developing waste acceptance criteria. We have also issued supplementary guidance on groundwater protection [4, 5].

We are tracking RWM's progress in this area through a Regulatory Observation (GDF_RO_001 - see Annex A). We engaged with RWM to discuss its approach to compliance with the GWDD and to establish clear and common understanding of the regulatory requirements. Overall we found RWM's implementation plan for the GWDD [6] to be clear and well written, and we suggested RWM should carry out a small number of assessments of chemical pollutants for a GDF in different geological and hydrogeological settings to test its approach.

## 2.3. Optimisation

RWM will need to demonstrate how GDF structures, systems and components are identified and selected to achieve a GDF design that is optimised for radiological protection and thereby ensure that radiological risks are as low as reasonably achievable.

We continued our discussions with RWM to establish a common and clear understanding of regulatory expectations regarding optimisation for radiological protection, and its appropriate use, as applied to

geological disposal. We have been formally tracking this dialogue (GDF_RO_002 - see Annex A). We are close to resolving this matter, subject to RWM clarifying their approach relating to application of optimisation for radiological protection and optioneering, and how these processes are applied throughout implementation of geological disposal. We expect to be able to close the RO during 2017.

## 2.4. Safeguards

We have advised RWM on the application of safeguards at a GDF, and this advice is reflected in RWM's paper to EURATOM [7]. We will continue to work with RWM as required, to ensure that the EURATOM expectations, with respect to Safeguards for a GDF, are fully met.

## 2.5. Lessons and requirements from international incidents

We asked RWM to consider the lessons learnt from nuclear incidents in recent years. We tracked these requests through two Regulatory Observations (GDF_RO_003 and GDF_RO_005 – see Annex A).

We requested that RWM should "consider the lessons learnt from the Fukushima disaster in the context of its geological disposal programme". RWM has made significant progress towards addressing the requirements of this RO and we will assess RWM's response to it in 2016-17.

RWM will also show that it has learnt lessons from the failings that led to the two incidents at the US Department of Energy Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico, in February 2014 [8, 9] to prevent similar events occurring in a GDF in the UK. RWM's work to resolve this RO is ongoing.

# 3. Disposal system specification and design

RWM will need to demonstrate to us that its geological disposal system provides the necessary protection for people and the environment. As part of this we expect RWM to demonstrate how, at the early design stage, it is taking into account our requirements. This includes how the facility and its structures, systems and components are identified and selected to achieve a GDF design that is optimised for radiological protection and thereby ensure that radiological risks to members of the public and workers are as low as reasonably achievable.

## 3.1. Generic disposal system functional and technical specifications

We advised RWM on its developing generic disposal system functional and technical specifications [10, 11]. RWM has, in general, taken on board our main comment with respect to lack of specificity [3].

We provided RWM with further comments [12] on progressing these documents, to inform its design reports, status reports and the safety cases. RWM advised us that its revised specifications should improve upon the 2010 versions with new sections on generic requirements for different geological environments,

environmental safety functions, and differentiating technical requirements from planning assumptions. We consider such additions will be an improvement and that development of the specifications is progressing appropriately to support ongoing development of a GDF and the generic Disposal System Safety Case (gDSSC). However, RWM needs to do more to explain its developing strategy for aligning 'requirements' with safety functions. RWM intends to issue the restructured versions, which we shall consider when we review its 2016 gDSSC.

## 3.2. Conceptual security arrangements

We advised RWM on its developing conceptual security arrangements for a GDF. In particular we advised RWM to consider the threat from sabotage or malicious activity, in addition to protection of material from theft.

RWM has provided a good overview of the generic security arrangements it is proposing for a GDF, which we consider covers the main areas we would expect to be addressed at this stage, and provides a baseline and framework which RWM can use to refine the security arrangements for the GDF as the GDF programme progresses.

## 3.3. Inventory

The UK Radioactive Waste and Materials Inventory (UKRWI) is produced every three years to provide a snapshot of wastes and material in existence at that time and to predict quantities and types of wastes arising in the future. NDA and DECC[ii] lead on this work and the latest inventory was produced in 2013. Based on the wider UKRWI, RWM produces a *Derived Inventory* of radioactive wastes that are in the inventory for geological disposal.

We reviewed the three Inventory reports [13, 14, 15] provided by RWM in July 2015 and we had no concerns regarding them, at this stage [16]. However, we will consider them again when we review the 2016 gDSSC.

We had previously said that RWM should include a wider exploration of waste inventory uncertainty in future revisions of its gDSSC, and take into account the most up to date inventory considerations, in future development of the gDSSC [3]. We understand that the former will be addressed in RWM's inventory scenarios report as part of the 2016 gDSSC.

# 4. Safety case development

Development of a safety case for a GDF is complex and it is recognised internationally that continual dialogue between the regulators and the developer, from the very early design stage, is essential. We want RWM to understand clearly what we require it to demonstrate, and when, through its environmental, operational and transport safety cases.

[ii] DECC became part of Department for Business, Energy and Industrial Strategy (BEIS) in July 2016

## 4.1. Review of RWM's generic disposal system safety case

RWM intends to submit its generic Disposal System Safety Case (gDSSC) in December 2016 for regulatory scrutiny. We engaged with RWM throughout this reporting period to plan our scrutiny of the 2016 gDSSC. Through our discussions with RWM we are now aware of those areas that have significantly changed since the 2010 gDSSC, and have a better understanding of how it may contribute to siting and any future site-specific safety cases. Our discussions with RWM have informed our preparations for reviewing it; and should provide for a more efficient and effective review process.

We do not expect our recommendations relating to safety case development from our review of the 2010 gDSSC [3, 17] to be fully resolved in the short term, but we note that RWM has made significant progress towards addressing them.

We advised RWM to:

- provide an explanation of how, in an operational sense, the gDSSC will support the development of a future site-specific safety case
- state clearly how generic designs can, and may need to, be adjusted to adapt to the real underground situation and if new developments are introduced
- clarify its position on deep borehole disposal and make it clear that the concept has not been excluded at this stage
- remedy the omissions regarding the many aspects of the EPR 2010 permit that will need to be complied with, including, for example, those concerning permit conditions for waste discharges and solid waste disposals from conventional construction, and for water abstraction/ pumping/ disposal, and pollution of water courses from naturally occurring substances
- consider how security and safeguards requirements can be taken into account throughout the process of facility design, construction and commissioning, and integrated into the gDSSC suite of documents
- be clear and open about potential risks that could be reduced or eliminated and therefore where design needs to be improved
- develop safety arguments using both a ‘top-down’ approach (e.g. identification of the safety functions associated with the various components of the disposal system) and a ‘bottom-up’ approach (e.g. identification of features, events and processes that could affect the disposal system)
- consider how optimisation of exposure from a radiological protection perspective can be demonstrated during the operational phase
- ensure the various documents within the gDSSC dovetail properly together, so that all the appropriate interfaces are made, and that there are no excessive overlaps or gaps

RWM told us that it found our recommendations and comments useful in preparing the gDSSC documentation, and that it will consider them when it finalises the 2016 gDSSC.

RWM will be using its internally approved safety manuals (transport, operational safety, and environmental safety) [18, 19, 20] to control the update of the safety case reports for the 2016 gDSCC. We consider that the Environmental Safety Manual [20] is a useful addition to the gDSSC. It is written at a fairly high, general, level, with more specific aspects covered by procedures and work instructions. We advised RWM [21] to make sure that the Environmental, Operational and Transport Safety Manuals are closely aligned and that the interactions between the different safety areas are clear. If this is done we consider the manuals will provide a useful tool for RWM in developing its safety cases.

## 4.2. Transport criticality: Fissile Exception Application (2012 IAEA Transport Regulations)

A provision in the 2012 edition of the IAEA Transport Regulations (known as SSR-6) [22] allows material to be excepted from the requirements for the transport of fissile material. Fissile exception approval requires an applicant to demonstrate that the material is safely subcritical without accumulation control in routine, normal and accident conditions of transport.

RWM has completed a disposal system change proposal to update its disposal system and the packaging advice it provides to take account of SRR-6 regulations and subsequently made an application for multilateral fissile exception [23, 24].

We concluded, from our inspection of RWM [25], that RWM's management systems were adequate for the purposes of ADR 2015 paragraph 1.7.3, in support of this application. In respect of the technical assessment of the application, we are largely satisfied with RWM's approach, however, we advised RWM of some areas that could be improved (for example, around: homogeneity of the waste; thermal effects in accidents; temperature ranges for calculations; preferential separation in accidents; and code / nuclear data validation). RWM has agreed to address our comments and resubmit the application.

# 5. Sustainability and environmental assessment

The Environment Agency is a statutory consultee for strategic environmental assessment (SEA) and environmental impact assessment (EIA). We have previously provided regulatory advice to RWM by our active involvement in its Sustainability Advisory Group (SAG). In the past year, we have not provided any significant input to RWM on SEA and EIA because UK government has been implementing changes to the land-use planning arrangements for geological disposal and associated deep boreholes, which have implications in relation to the requirement for SEA and EIA.

We will continue to engage with RWM on sustainability and environmental assessment as the process for implementing geological disposal proceeds.

# 6. Research and development

We expect the best scientific knowledge and engineering practice to underpin any future GDF. We expect RWM to undertake a comprehensive research and development (R&D) programme, informed by wider national and international research or implementation programmes. RWM should address, in a timely manner, the issues that require R&D to meet our requirements. This will help RWM to avoid unnecessary delays when requesting regulatory approval for the various stages of geological disposal.

## 6.1. RWM's technical programme

RWM's Science and Technology (S&T) Programme and Plan set out its generic research needs for a period of around ten years. We advised RWM to maintain a credible, prioritised and needs-driven programme. We provided advice to RWM on its developing S&T Plan [26, 27] and it will consider our advice when it updates the S&T Plan and Programme [28, 29]. In particular, RWM informed us that its revised S&T programme will be in a more accessible format, which we hope will be a significant improvement.

We will assess RWM's revised S&T Programme and Plan though our future scrutiny work in order to gain confidence that RWM is delivering a targeted and prioritised R&D Programme that will support a future site specific R&D Programme, and confidence that RWM is continuing to develop the technical skill set it requires to deliver a GDF.

## 6.2. Criticality

RWM has gathered and presented evidence to support its assertion that separate, deterministically derived post-closure fissile material limits (over and above those calculated for the operational and transport phases of a GDF) are not required in order to demonstrate criticality safety. We consider that RWM's work in this area has reached a level of maturity such that it can underpin pragmatic waste packaging advice, so we asked RWM to progress this matter [30 and GDF_RO_004 – see Annex A] and to engage with waste producers to help inform and progress packaging plans. RWM has proposed a revised methodology, which includes an option to base fissile material limits on a "generic low likelihood package envelope", derived from a probabilistic modelling approach, to support and justify the use of fissile material limits that are less restrictive than those derived from deterministic scenarios. RWM intends to incorporate the revised methodology into its Disposability Assessment process (by way of a formal change control).

We are content with the new approach that RWM has adopted. However, we have asked RWM to provide greater clarity by explaining: how it will use the approach in providing disposability advice to waste packagers; how it might extend the approach to encompass wastes other than Low Heat Generating Waste (LHGW); the approach it would adopt for those (few) wastes not encompassed within the current envelope; and its engagement with stakeholders (such as, Committee on Radioactive Waste Management (CoRWM) and the Working Party on Criticality). RWM's work to resolve this RO is ongoing.

# 7. Site evaluation and characterisation

We expect RWM to have appropriate plans and procedures in place to undertake the wide range of site evaluation and characterisation activities required to implement geological disposal, including development of any Initial Site Evaluation (ISE), Preliminary Environmental Safety Evaluation (PESE), and site-specific safety cases. In particular, we want to ensure that RWM's plans and actions for future investigations are consistent with the permit requirements for intrusive site investigations.

Despite not actively engaging with RWM on this topic during this reporting period, we are maintaining an overview of RWM's plans and work to support site characterisation. We want to ensure that RWM's programme allows sufficient time for preparatory activities such as borehole design, rig procurement, and appropriate regulatory scrutiny. We accept that understanding the detailed scope of the front-end

programme for site investigations might not progress significantly until communities become actively involved in the siting process.

# 8. Waste packaging advice and assessment

RWM has developed a process of disposability assessment to minimise the risk that the conditioning and packaging of radioactive wastes results in packages incompatible with geological disposal. Through this process RWM provides advice to waste producers on the packaging of their HAW. Waste producers use this advice to inform their integrated waste strategies and safety cases and as a component of any radioactive waste management case (RWMC) for a particular waste stream.

For wastes destined for deep geological disposal, the regulators expect a Letter of Compliance (LoC), as part of the wider RWMC, will be issued by RWM stating that the conditioned waste is likely to be acceptable for future disposal (Section 5 of [31]).

We expect RWM to assess packaging proposals for HAW in a proportionate manner, against clear and consistent published specifications, to assure us that HAW is packaged in a manner suitable for handling and disposal in a future GDF, and to share good practice in waste packaging to avoid duplication of effort.

## 8.1. RWM’s process of disposability assessment

From our most recent inspection of RWM's disposability assessment process we concluded that it is generally robust and provides waste producers with the information and advice necessary to minimise the risks that HAW stored on licensed sites in England and Wales will not be suitable for safe handling, transport, storage and disposal [32]. However, we identified some areas that could be improved and are monitoring RWM’s work in response to these recommendations [33, 34 and RIs 5, 6, 7, 10, 11 – see Annex A]. RWM is also continuing to revise the process as part of continuous improvement, including in response to feedback from waste producers. We receive and review packaging advice outputs from RWM routinely, and we will continue to engage with RWM, as necessary.

## 8.2. Waste package records

We require operators to define the information and records they need in order to demonstrate compliance with their permits (GRA Requirement 4 [2]) and licence conditions (ONR LC6 and [35]). Waste package information and records are generated throughout the lifecycle of the waste, so it is vital that RWM takes early measures to ensure that the information and records being collected by waste producers and packagers are complete and in a suitable format [31 and GDF_RI_011 – see Annex A]. We want to ensure that appropriate information is identified, collected and maintained to support the safe long term management of wastes and demonstrate disposability.

The NDA Waste Package Records (WPR) project is delivered by RWM with the objective to develop consistent cross-industry technical advice and guidance, addressing important issues and improvement plans. The regulators have oversight of the project and we commented on RWM’s draft revised

specification for waste package records [36]. We provided advice on RWM's requirements and associated guidance [37, 38] as follows [39, 40]:

- reach agreement with waste packagers on what constitutes the waste package record
- engage with us in developing an 'acceptance approach' for waste package records
- clarify whether waste packages deemed compliant under the old/existing specification will be automatically deemed compliant under the revised specification
- define a class of underpinning or supporting documentation that RWM will hold, to which waste packagers can simply make reference
- clarify the scope of the work (that is, does it apply only to ILW, or to all wastes intended for geological disposal?)
- benchmark itself against other national and international experience, with respect to waste package records
- continue to work with organisations responsible for managing radioactive waste to establish (as far as possible) common systems and approaches for creating, maintaining and managing comprehensive, accurate and reliable records through all stages of the lifecycle
- establish a waste package records approval process to give waste packagers a degree of assurance of the suitability of their waste package records well before they are consigned to a GDF
- review and take on board the lessons learned from previous audits of package records, in order to demonstrate that previously endorsed packaging proposals (now with their associated records) remain valid

We consider that RWM's work in this area represents a significant step towards ensuring appropriate information and records are identified, collected, maintained and available. As waste packaging is on-going we do not consider that the lack of a specific GDF site precludes making significant progress in defining standardised approaches towards waste package information and records management, such that the waste package records are appropriate and in a suitable format for their ongoing management when they arrive, with the wastes, at a future GDF.

# 9. Organisational development

RWM was established as a wholly-owned subsidiary of the NDA in April 2014 and has been operating as a prospective Site Licence Company (SLC) since 2009 (previously as NDA's Radioactive Waste Management Directorate, RWMD) [41]. We have continued to engage with RWM and provided regulatory advice on its programme of organisational development as a prospective SLC. We want to ensure RWM maintains progress in developing as a company suitable to hold the necessary licences and permits to develop and implement a GDF.

In February 2016, we undertook a joint regulatory inspection of RWM's organisational management arrangements. The aim of the inspection was to seek assurance that RWM had continued to take appropriate actions to develop as a prospective SLC. Our approach for the inspection was to sample and assess RWM's governance, staffing and management arrangements. We interviewed people from across the organisation including the Managing Director, Executive Directors, managers and staff.

We concluded from the inspection that RWM is continuing to make progress towards an organisation that could hold an environmental permit and a nuclear site licence for any future GDF [42]. It remains RWM's responsibility to identify its development needs to meet regulatory expectations for a holder of an environmental permit and a nuclear site licence and to decide when it is capable enough to submit formal applications to the regulators.

We will continue to provide advice to RWM on its organisational development provided this does not compromise our regulatory independence. We will consider undertaking a further inspection to review RWM's organisational development, the timing of which will depend on progress being made with the programme to implement geological disposal.

In response to our advice from our data and models inspection in 2014 [43], RWM has strengthened its Health, Safety, Security, Environment and Quality (HSSEQ) function to provide improved in-house assurance capability and delivery. RWM's Board has also established a HSSEQ sub-committee. In addition, RWM advised that it intends to create a clear separation between its HSSEQ systems and independent oversight functions as well as strengthening both functions (GDF_RI_009 – see Annex A). We consider RWM is making progress in developing the HSSEQ and independent oversight understanding and arrangements that we would expect for a holder of an environmental permit and a nuclear site licence.

# ANNEX A: List of Regulatory issues and observations

The current list of Regulatory Issues (RI) and Regulatory Observations (RO) are as follows:

## Regulatory Issues:

| RI Number | Title | Status @ March 2016 |
|---|---|---|
| GDF_RI_001 | Leadership & governance | Open |
| GDF_RI_002 | Organisational capability | Open |
| GDF_RI_003 | Control & assurance | Open |
| GDF_RI_004 | Organisational learning | Open |
| GDF_RI_005 | Assessment of innovative packaging proposals | Open |
| GDF_RI_006 | Resolution of Periodic Review Findings | Open |
| GDF_RI_007 | Assurance of packaging assessments and advice | Open |
| GDF_RI_008 | Board governance of important areas of risk/performance | Open |
| GDF_RI_009 | Corporate HSSEQ structure | Open |
| GDF_RI_010 | Disposability Assessments and Endorsements sensitive to changes | Open |
| GDF_RI_011 | Waste Package Records | Open |

## Regulatory Observations:

| RO Number | Title | Status @ March 2016 |
|---|---|---|
| GDF_RO_001 | Protection against non-radiological hazards | Open |
| GDF_RO_002 | Optimisation | Open |
| GDF_RO_003 | Lessons from the Fukushima disaster | Open |
| GDF_RO_004 | Defining waste package fissile limits for disposal | Open |
| GDF_RO_005 | Lessons from the WIPP Incident | Open |

# Annex B: Glossary

| | |
|---|---|
| ADR | European Agreement Concerning the International Carriage of Dangerous Goods by Road |
| BEIS | Department for Business, Energy and Industrial Strategy |
| CoRWM | Committee on Radioactive Waste Management |
| DECC | Department of Energy and Climate Change |
| DSSC | Disposal System Safety Case |
| EA | Environment Agency |
| EIA | Environmental Impact Assessment |
| EPR 2010 | Environmental Permitting (England and Wales) Regulations 2010 |
| Euratom | The European Atomic Energy Community[iii] |
| GDF | Geological Disposal Facility |
| gDSSC | generic Disposal System Safety Case |
| GWDD | Ground Water Daughter Directive |
| HAW | Higher Activity radioactive Waste |
| HSSEQ | Health, safety, security, environment and quality |
| IAEA | International Atomic Energy Agency |
| ILW | Intermediate Level radioactive Waste |
| LoC | Letter of Compliance |
| NDA | Nuclear Decommissioning Authority |
| NRW | Natural Resources Wales |
| ONR | Office for Nuclear Regulation |
| PESE | Preliminary Environmental Safety Evaluation |
| R&D | Research and Development |
| RIRP | Regulatory Issue Resolution Process |
| RI | Regulatory Issue |
| RO | Regulatory Observation |
| RWMC | Radioactive Waste Management Case |
| RWMD | Radioactive Waste Management Directorate (to 31 March 2014) |
| RWM | Radioactive Waste Management Limited (from 1 April 2014) |
| SAG | Sustainability Assessment Group |
| SEA | Strategic Environmental Assessment |

[iii] Co-ordination of European Community activities (such as research, safety standards) for the peaceful use of nuclear energy.

| | |
|---|---|
| SEPA | Scottish Environment Protection Agency |
| SLC | Site Licence Company |
| SSR | Specific Safety Requirement |
| S&T | Science and Technology |
| UKRWI | United Kingdom Radioactive Waste Inventory |
| WIPP | Waste Isolation Pilot Plant (in New Mexico, USA) |
| WPR | Waste Package Records |

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